

What is claimed is:

1. A method of determining a recording velocity of a signal
by a write laser beam onto an optical disc, the method
5 comprising the steps of:

undergoing a test recording of a signal onto a
predetermined area of the optical disc prior to an actual
recording at one or more levels of the recording velocity;

10 reproducing the signal by a read laser beam from
the predetermined area of the optical disc;

generating a first characteristic in function of the
recording velocity based on the reproduced signal, the first
characteristic representing a relation between an optical
feature of the laser beam and a qualitative parameter of a
15 recording state of the signal, the optical feature being
expressed in terms of either a β value obtained from the
read laser beam reflected back from the optical disc or a
power of the writing laser beam;

20 generating a second characteristic from the first
characteristic based on a predetermined preferable range of
the qualitative parameter, such that the second
characteristic represents a relation between the recording
velocity and an available range of the optical feature
corresponding to the predetermined preferable range of the
25 qualitative parameter of the recording state; and

determining a preferable value of the recording
velocity according to the second characteristic and a

predetermined preferable range of the optical feature which is predetermined to obtain the preferable recording state.

2. The method according to claim 1, further comprising the steps of storing a plurality of preferable ranges of the qualitative parameter and a plurality of preferable ranges of the optical feature in correspondence with a plurality of types of optical discs, and detecting the type of the optical disc under the test recording, such that the step of generating the second characteristic uses the optical range of the qualitative parameter corresponding to the detected type of the optical disc, and the step of determining uses the preferable range of the optical feature corresponding to the detected type of the optical disc.

3. The method according to claim 1, wherein the step of generating the first characteristic adopts the qualitative parameter selected from the group consisting of a frequency of detecting a frame synchronization signal contained in the signal reproduced from the optical disc, a C1 error contained in the reproduced signal, a jitter of the reproduced signal, a deviation of the reproduced signal, a degree of modulation applied to the laser beam, a reflectance of the laser beam from the optical disc and an amplitude of the reproduced signal.

4. An apparatus for recording a signal onto an optical disc

by a write laser beam at a certain recording velocity, the apparatus comprising:

5 a test recording section that undergoes a test recording of a signal onto a predetermined area of the optical disc prior to an actual recording at one or more levels of the recording velocity;

a reproducing section that reproduces the signal by a read laser beam from the predetermined area of the optical disc;

10 a first generating section that generates a first characteristic in function of the recording velocity based on the reproduced signal, the first characteristic representing a relation between an optical feature of the laser beam and a qualitative parameter of a recording state of the signal, the optical feature being expressed in terms of either a β value
15 obtained from the read laser beam reflected back from the optical disc or a power of the writing laser beam;

20 a second generating section that generates a second characteristic from the first characteristic based on a predetermined preferable range of the qualitative parameter, such that the second characteristic represents a relation between the recording velocity and an available range of the optical feature corresponding to the predetermined preferable range of the qualitative parameter of the recording state;
25 and

a determining section that determines a preferable value of the recording velocity according to the second

characteristic and a predetermined preferable range of the optical feature which is predetermined to obtain the preferable recording state.

5 5. The apparatus according to claim 5, further comprising:

10 a storing section that stores a plurality of preferable ranges of the qualitative parameter and a plurality of preferable ranges of the optical feature in correspondence with a plurality of types of optical discs; and

15 a detecting section that detects the type of the optical disc under the test recording, such that the second generating section uses the optical range of the qualitative parameter corresponding to the detected type of the optical disc, and the determining section uses the preferable range of the optical feature corresponding to the detected type of the optical disc.

20 6. The apparatus according to claim 4, wherein the first generating section adopts the qualitative parameter selected from the group consisting of a frequency of detecting a frame synchronization signal contained in the signal reproduced from the optical disc, a C1 error contained in the reproduced signal, a jitter of the reproduced signal, a deviation of the reproduced signal, a degree of modulation applied to the
25 laser beam, a reflectance of the laser beam from the optical disc and an amplitude of the reproduced signal.

7. The apparatus according to claim 4, further comprising:

a setting section that is operated by a user for setting a desired recording velocity; and

5 a judging section that judges whether the actual recording of the signal onto the optical disc is possible or not according to the determined preferable value of the recording velocity.

10 8. The apparatus according to claim 7, further comprising an adjusting section operative when the judging section judges that the actual recording is not possible since the desired recording velocity exceeds the preferable recording velocity, for shifting the desired recording velocity below the
15 preferable recording velocity so as to enable the recording of the signal.

9. The apparatus according to claim 8, further comprising a predicting section that predicts a time necessary for the
20 recording at the shifted recording velocity, and an indicating section that indicates the predicted time to the user.

10. The apparatus according to claim 4, further comprising:

25 a driving section that operates in the recording of the signal for selectively driving the optical disc in either of a CLV mode where the optical disc is rotated at a constant

linear velocity or a CAV mode where the optical disc is rotated at a constant angular velocity; and

a control section that controls the driving section to switch between the CLV mode and the CAV mode according to the determined preferable recording velocity.

11. A computer program for use in a disc apparatus having a processor for recording a signal onto an optical disc by a write laser beam at a preferable recording velocity, the computer program being executed by the processor for enabling the disc apparatus to perform a process comprising the steps of:

undergoing a test recording of a signal onto a predetermined area of the optical disc prior to an actual recording at one or more levels of the recording velocity;

reproducing the signal by a read laser beam from the predetermined area of the optical disc;

generating a first characteristic in function of the recording velocity based on the reproduced signal, the first characteristic representing a relation between an optical feature of the laser beam and a qualitative parameter of a recording state of the signal, the optical feature being expressed in terms of either a β value obtained from the read laser beam reflected back from the optical disc or a power of the writing laser beam;

generating a second characteristic from the first characteristic based on a predetermined preferable range of

the qualitative parameter, such that the second characteristic represents a relation between the recording velocity and an available range of the optical feature corresponding to the predetermined preferable range of the qualitative parameter of the recording state; and

determining a preferable value of the recording velocity according to the second characteristic and a predetermined preferable range of the optical feature which is predetermined to obtain the preferable recording state.

12. A method of determining a power of a writing optical beam used for recording of a signal onto an optical disc, the method comprising the steps of:

undergoing a test recording of a signal onto a predetermined teal area of the optical disc prior to an actual recording;

reproducing the signal from the predetermined test area of the optical disc;

generating a recording characteristic according to the reproduced signal, representing a relation between $\Delta \beta$ and the power of the writing optical beam, the $\Delta \beta$ indicating a variation of β value per a unit amount of the power of the writing optical beam, the β value being derived from a variation of an amplitude of the reproduced signal;

and

determining a preferable power of the writing optical beam according to the generated recording

characteristic with using a preferable range of $\Delta\beta$, which is predetermined for realizing a preferable recording.

13. A method of determining a power of a writing optical beam used for recording of a signal onto an optical disc, the method comprising the steps of:

undergoing a test recording of a signal onto a predetermined teal area of the optical disc prior to an actual recording;

reproducing the signal from the predetermined test area of the optical disc;

generating a recording characteristic according to the reproduced signal, representing a relation between the power of the writing optical beam and at least one of qualitative parameters being associated to a quality of the recording and being selected from a group consisting of a frequency of detecting a frame synchronization signal contained in the signal reproduced from the optical disc, a Cl error contained in the reproduced signal, a jitter of the reproduced signal, a deviation of the reproduced signal, a degree of modulation applied to the laser beam, a reflectance of the laser beam from the optical disc and an amplitude of the reproduced signal; and

determining a preferable power of the writing optical beam for use in the actual recording according to the generated recording characteristic.

14. A method of determining a power of a writing optical beam used for recording of a signal onto an optical disc, the method comprising the steps of:

undergoing a test recording of a signal onto a
5 predetermined teal area of the optical disc prior to an actual recording;

reproducing the signal from the predetermined test area of the optical disc;

generating one recording characteristic according to
10 the reproduced signal, representing a relation between the power of the writing optical beam and one of qualitative parameters being associated to a quality of the recording and being selected from a group consisting of a β value derived from a variation of an amplitude of the reproduced signal, a
15 frequency of detecting a frame synchronization signal contained in the signal reproduced from the optical disc, a C1 error contained in the reproduced signal, a jitter of the reproduced signal, a deviation of the reproduced signal, a degree of modulation applied to the laser beam, a reflectance
20 of the laser beam from the optical disc and an amplitude of the reproduced signal;

generating another recording characteristic according to the reproduced signal, representing a relation between the power of the writing optical beam and another of
25 the qualitative parameters; and

determining a preferable power of the writing optical beam for use in the actual recording according to the

generated recording characteristics.

15. The method according to claim 14, wherein the step of
generating comprises generating at least the recording
5 characteristic representing the relation between the power of
the optical beam and the β value.

16. The method according to claim 15, wherein the step of
determining comprises determining a preferable level of the
10 power according to first recording characteristic
representing the relation between the power and the β value,
determining a preferable range of the power according to
second recording characteristic representing the relation
between the power and a qualitative parameter other than the
15 β value, and determining whether the determined level is
included in the determined range.

17. The method according to claim 14, wherein the step of
reproducing comprises reproducing the signal at a reading
20 rate which is set smaller than a writing rate of the signal
at the test recording.

18. The method according to claim 14, wherein the step of
reproducing comprises reproducing a plurality of the signals
25 by undergoing a plurality of reproducing sessions on the test
area.

19. An apparatus for recording a signal onto an optical disc by a writing optical beam having a preferable power, the apparatus comprising:

5 a test recording section that undergoes a test recording of a signal onto a predetermined test area of the optical disc prior to an actual recording;

a reproducing section that reproduces the signal from the predetermined test area of the optical disc;

10 a generating section that generates a recording characteristic according to the reproduced signal, representing a relation between $\Delta\beta$ and the power of the writing optical beam, the $\Delta\beta$ indicating a variation of β value per a unit amount of the power of the writing optical beam, the β value being derived from a variation of an amplitude of the reproduced signal; and

15 a determining section that determines a preferable power of the writing optical beam according to the generated recording characteristic with using a preferable range of $\Delta\beta$, which is predetermined for realizing a preferable recording.

20 20. An apparatus for recording a signal onto an optical disc by a writing optical beam having a preferable power, the apparatus comprising:

25 a test recording section that undergoes a test recording of a signal onto a predetermined test area of the optical disc prior to an actual recording;

a reproducing section that reproduces the signal from the predetermined test area of the optical disc;

a generating section that generates a recording characteristic according to the reproduced signal, representing a relation between the power of the writing optical beam and at least one of qualitative parameters being associated to a quality of the recording and being selected from a group consisting of a frequency of detecting a frame synchronization signal contained in the signal reproduced from the optical disc, a C1 error contained in the reproduced signal, a jitter of the reproduced signal, a deviation of the reproduced signal, a degree of modulation applied to the laser beam, a reflectance of the laser beam from the optical disc and an amplitude of the reproduced signal; and

a determining section that determines a preferable power of the writing optical beam for use in the actual recording according to the generated recording characteristic.

21. An apparatus for recording a signal onto an optical disc by a writing optical beam having a preferable power, the apparatus comprising:

a test recording section that undergoes a test recording of a signal onto a predetermined test area of the optical disc prior to an actual recording;

a reproducing section that reproduces the signal from the predetermined test area of the optical disc;

a generating section that generates one recording

characteristic according to the reproduced signal,
representing a relation between the power of the writing
optical beam and one of qualitative parameters being
associated to a quality of the recording and being selected
5 from a group consisting of a β value derived from a
variation of an amplitude of the reproduced signal, a
frequency of detecting a frame synchronization signal
contained in the signal reproduced from the optical disc, a
C1 error contained in the reproduced signal, a jitter of the
10 reproduced signal, a deviation of the reproduced signal, a
degree of modulation applied to the laser beam, a reflectance
of the laser beam from the optical disc and an amplitude of
the reproduced signal;

another generating section that generates another
5 recording characteristic according to the reproduced signal,
representing a relation between the power of the writing
optical beam and another of the qualitative parameters; and

a determining section that determines a preferable
power of the writing optical beam for use in the actual
20 recording according to the generated recording
characteristics.

22. A computer program for use in a disc apparatus having a
processor for recording a signal onto an optical disc by a
25 writing optical beam having a preferable power, the computer
program being executable by the processor for enabling the
disc apparatus to perform a process comprising the steps of:

undergoing a test recording of a signal onto a predetermined teal area of the optical disc prior to an actual recording;

reproducing the signal from the predetermined test area of the optical disc;

generating a recording characteristic according to the reproduced signal, representing a relation between $\Delta \beta$ and the power of the writing optical beam, the $\Delta \beta$ indicating a variation of β value per a unit amount of the power of the writing optical beam, the β value being derived from a variation of an amplitude of the reproduced signal; and

determining a preferable power of the writing optical beam according to the generated recording characteristic with using a preferable range of $\Delta \beta$, which is predetermined for realizing a preferable recording.

23. A computer program for use in a disc apparatus having a processor for recording a signal onto an optical disc by a writing optical beam having a preferable power, the computer program being executable by the processor for enabling the disc apparatus to perform a process comprising the steps of:

undergoing a test recording of a signal onto a predetermined teal area of the optical disc prior to an actual recording;

reproducing the signal from the predetermined test area of the optical disc;

generating a recording characteristic according to the reproduced signal, representing a relation between the power of the writing optical beam and at least one of qualitative parameters being associated to a quality of the recording and being selected from a group consisting of a frequency of detecting a frame synchronization signal contained in the signal reproduced from the optical disc, a C1 error contained in the reproduced signal, a jitter of the reproduced signal, a deviation of the reproduced signal, a degree of modulation applied to the laser beam, a reflectance of the laser beam from the optical disc and an amplitude of the reproduced signal; and

determining a preferable power of the writing optical beam for use in the actual recording according to the generated recording characteristic.

24. A computer program for use in a disc apparatus having a processor for recording a signal onto an optical disc by a writing optical beam having a preferable power, the computer program being executable by the processor for enabling the disc apparatus to perform a process comprising the steps of:

undergoing a test recording of a signal onto a predetermined teal area of the optical disc prior to an actual recording;

reproducing the signal from the predetermined test area of the optical disc;

generating one recording characteristic according to

the reproduced signal, representing a relation between the power of the writing optical beam and one of qualitative parameters being associated to a quality of the recording and being selected from a group consisting of a β value derived from a variation of an amplitude of the reproduced signal, a frequency of detecting a frame synchronization signal contained in the signal reproduced from the optical disc, a C1 error contained in the reproduced signal, a jitter of the reproduced signal, a deviation of the reproduced signal, a degree of modulation applied to the laser beam, a reflectance of the laser beam from the optical disc and an amplitude of the reproduced signal;

generating another recording characteristic according to the reproduced signal, representing a relation between the power of the writing optical beam and another of the qualitative parameters; and

determining a preferable power of the writing optical beam for use in the actual recording according to the generated recording characteristics.